



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

GEOMETRY.

497. Proposed by NATHAN ALTHILLER, University of Oklahoma.

Find the locus of the mid-point of the segment determined by two spheres on any line passing through any point common to the two spheres.

498. Proposed by FRANK R. MORRIS, Glendale, California.

To trisect an angle ABC , on BA and BC take D and E equidistant from B . Using DE as a diameter draw the semicircle $DFGE$. With the same radius and D and E as centers draw arcs locating the points F and G on this semicircle. Connect F and G with B . Prove that this method trisects a right angle and a straight angle and that it does not trisect an oblique angle.

CALCULUS.

415. Proposed by GEORGE PAASWELL, New York City, N. Y.

If r is the distance from a fixed point (x, y, z) to a variable point (x', y') , in the plane $z = 0$; determine the values of the integrals $\iint r dx'dy'$ and $\iint \log(z + r) dx'dy'$ for the two cases

- (a) when the integration is extended over the surface of the circle of radius R ; and
- (b) when the integration is extended over the surface of the rectangle of dimensions a, b .

These integrals are special cases of the direct and logarithmic potentials, the densities of the surface distributions being taken as unity.

416. Proposed by CHARLES N. SCHMALL, New York City, N. Y.

If A be a point on a cycloid and C the corresponding position of the center of the generating circle, show that AC envelops another cycloid half the size of the first.

MECHANICS.

332. Proposed by E. E. MOOTS, University of Arizona.

In any quadrilateral $ABCD$ whose diagonals AB and BD intersect in E , lay off on AC from C , CF equal to AE . Join F to B . Join G , the middle point of BE , to D . On GD lay off GM equal to one-third of GD . Prove that M is the center of gravity of the quadrilateral.

333. Proposed by CLIFFORD N. MILLS, Brookings, South Dakota.

A flywheel 21 feet in diameter makes 100 revolutions per minute. The weight of a cubic foot of its material is 448 pounds. Show that the intensity of stress on a transverse section of rim, assuming that it is unaffected by the arms, is 1,176 lbs. per sq. in. If the safe stress permissible in the material is 6,000 lbs. per sq. in., show that the greatest speed at which the wheel can be run with safety is about 225 revolutions per minute.

NUMBER THEORY.

251. Proposed by HERMAN ROLAND KATNICK, Chicago, Ill.

Determine the character of the positive integer n so that the Diophantine system

$$z + n = x^2, \quad z - n = y^2$$

shall have an integral solution; and exhibit a method for finding all the values of x, y, z for a given n of such character.

252. Proposed by E. J. MOULTON, Northwestern University.

(A) Show that the number of integers x on the interval $10^r \leq x < 10^{r+1}$ which do not contain the digit 1 at least p times, $p \leq r$, is

$$9 \cdot \{[\text{first } p \text{ terms of expansion of } (9 + 1)^r] - ,C_{p-1} \cdot 9^{r-p}\}$$

where $,C_{p-1}$ is the coefficient of x^{p-1} in the expansion of $(1 + x)^r$.

(B) Show that the number of integers x on the interval $10^r \leq x < 10^{r+1}$ which do not contain the digit 0 at least p times, $p \leq r$, is

$$9 \cdot [\text{first } p \text{ terms of expansion of } (9 + 1)^r].$$